

# National Renewable Energy Laboratory

## NREL Overview and Perspective

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**Associate Director**

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# Major Department of Energy Laboratories

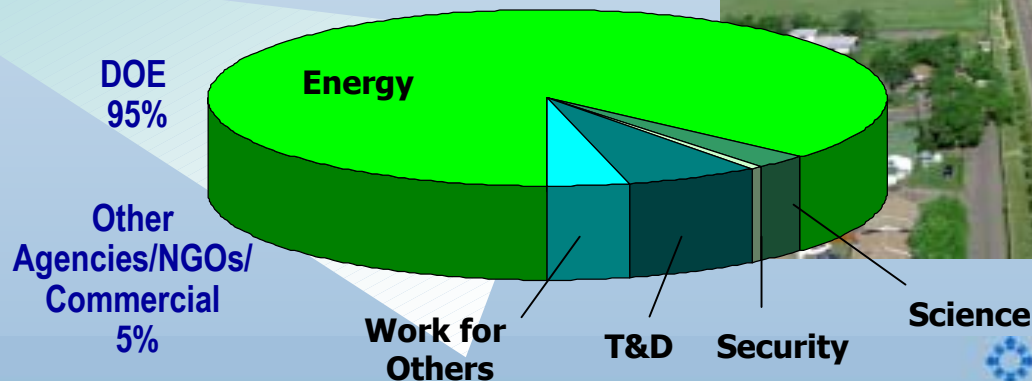


- National Nuclear Security Agency
- Office of Science
- Energy Efficiency and Renewable Energy
- Office of Nuclear Energy
- Fossil Energy

# National Renewable Energy Laboratory

**Mission:** *Develop renewable energy and energy efficiency technologies and practices, advance related science and engineering, and transfer knowledge and innovations to address the nation's energy and environmental goals*

- Government Owned, Contractor Operated
  - Steward: Office of Energy Efficiency and Renewable Energy
  - Managed by MRI since 1977, with Battelle since 1998
- 1100 staff
- \$215 million annual BV

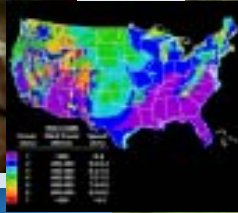
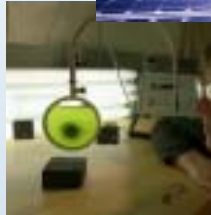




# Major Research Programs

## Renewable Resources

- Wind
- Solar
- Biomass
- Geothermal



## Efficient Energy Use

- Vehicle Technologies
- Building Technologies
- Advanced Industrial Technologies

## Energy Delivery & Storage

- Electricity Transmission & Distribution
- Alternative Fuels
- Hydrogen Delivery and Storage

Basic Science ♦ Analysis ♦ Technical Assistance

# Major Research Facilities/Capabilities

## National Center for Photovoltaics



Outdoor Test Facility



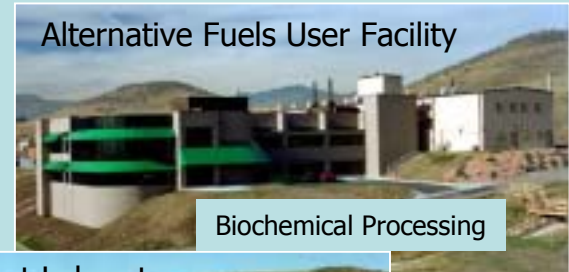
Thin Film Manufacturing R&D

Under Construction

Science & Technology Facility

## National Bioenergy Center

Alternative Fuels User Facility



Biochemical Processing

Field Test Laboratory



Thermochemical Processing

## National Wind Technology Center



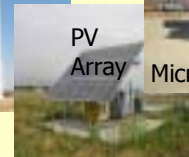
Blade Test Facility



Turbine Test Facility



Wind Turbines



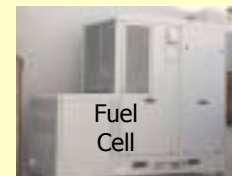
PV Array



MicroTurbine



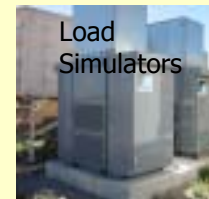
Grid Simulator



Fuel Cell



Electrolyzer



Load Simulators



Data Acquisition

## Distributed Power and Hydrogen Systems Test Facilities

# Major Research Facilities/Capabilities

## Vehicle and Fuels R&D

### Refuel Laboratories



Chassis Dynamometer



Fuels Chemistry Lab

### Auxiliary Load Laboratories



Battery Test Lab



Visualization and Testing



Thermal Manikin

## Buildings R&D

### Thermal Test Facility



HVAC Test Loop

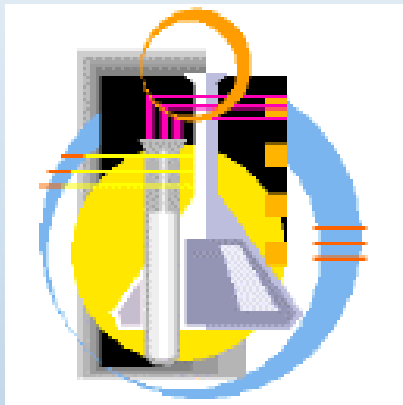


Other NREL Facilities

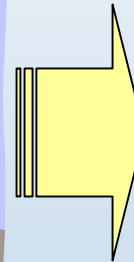
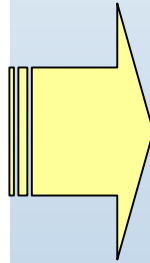


# NREL/DOE Mission Success: Realize the Value of Public Investment

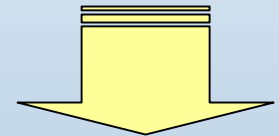
Taxpayer investment



**Knowledge & Technology**



**Successful Businesses**

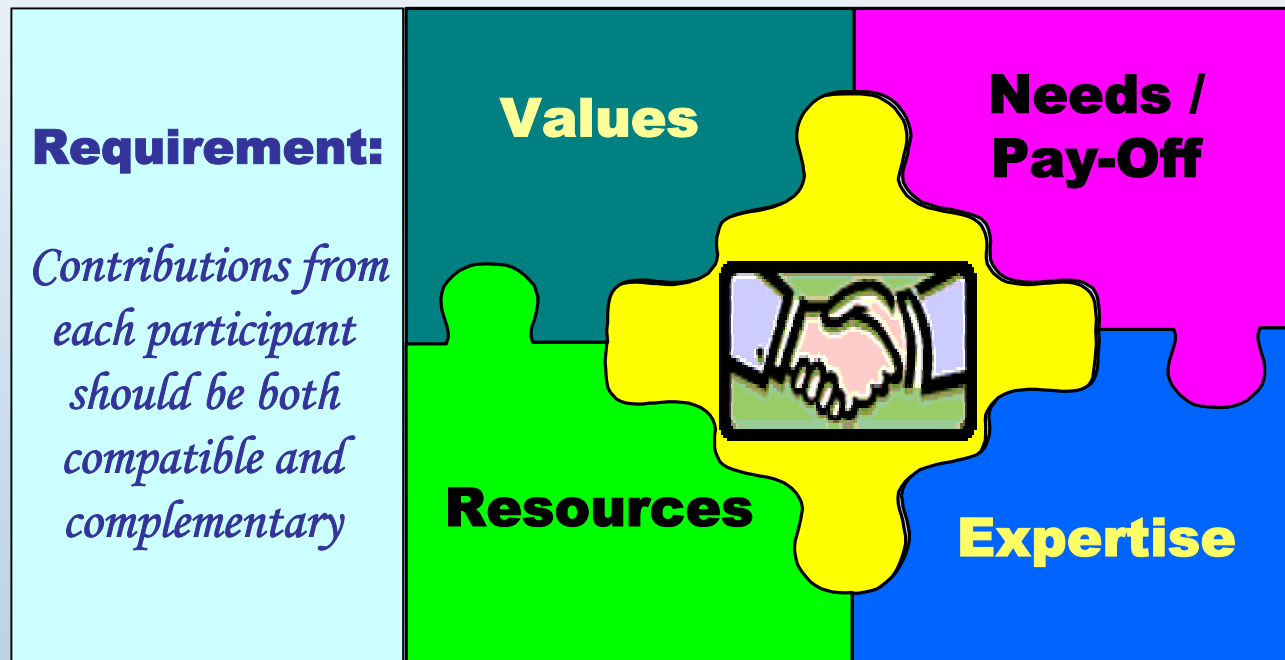


**Public Benefit**

- Security
- Economic Development
- Environmental Quality

Partnerships Bridge Chasm between 'Technology Focus' and 'Business Focus'

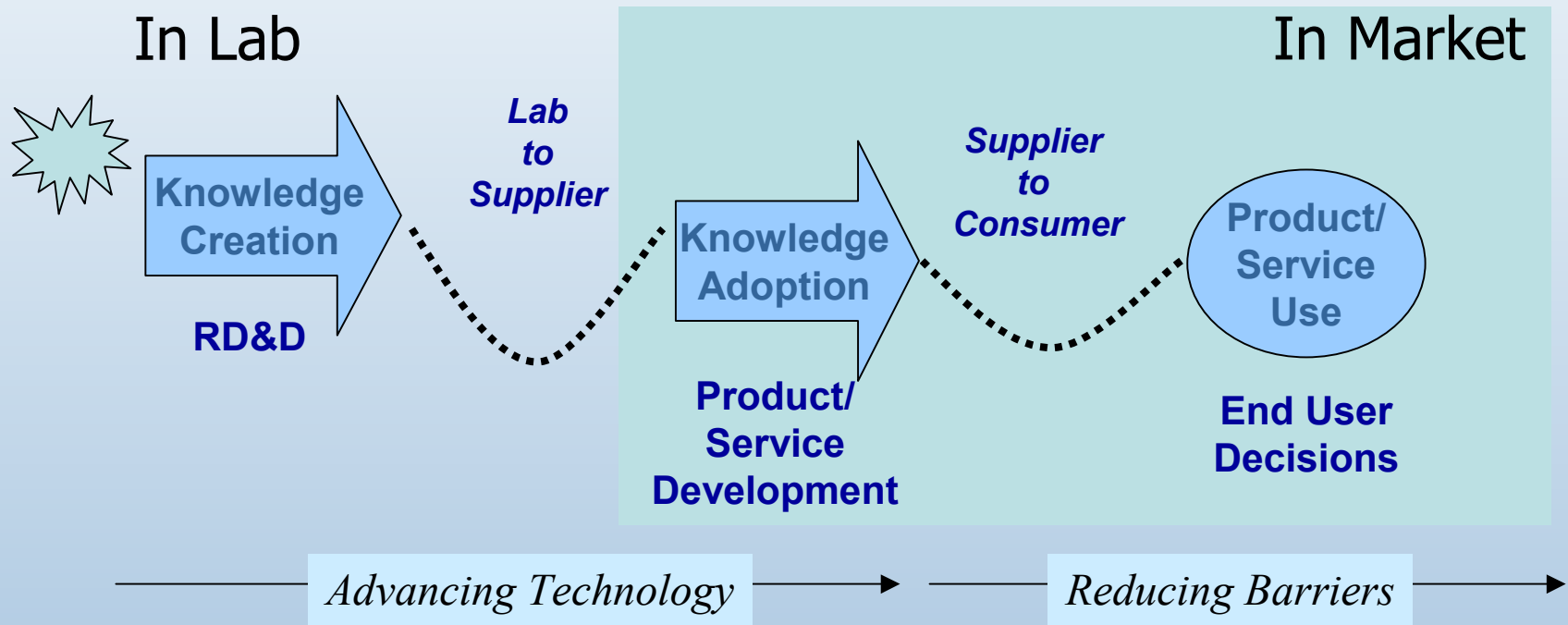
# Effective Partnerships



**Establish reciprocal value among the partners  
to shift focus from 'technology' to 'market'**



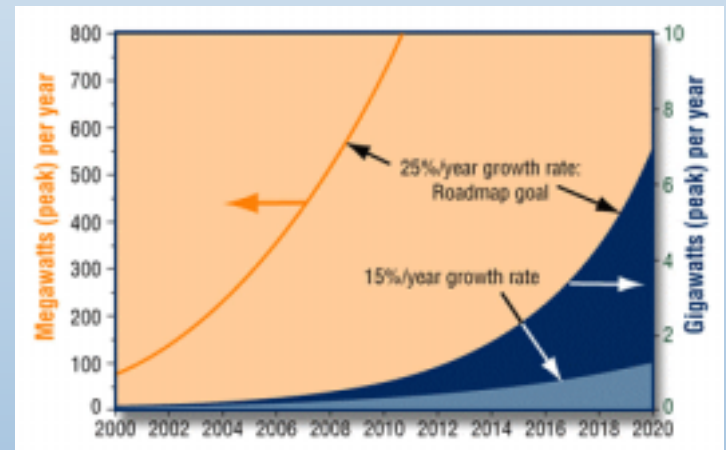
# NREL Partnership Overview



# Partnerships to Establish R&D Directions



## PV Industry Roadmap



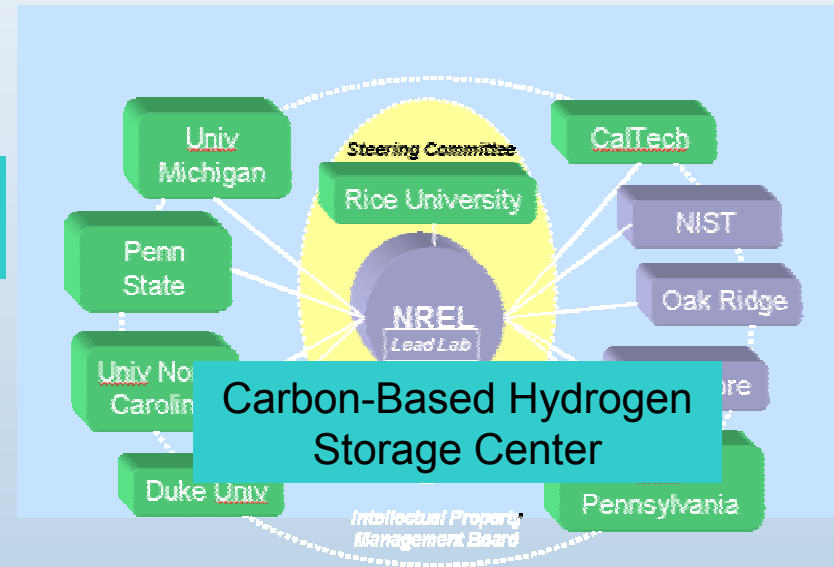
# RD&D Partnerships...



Distributed Energy R&D Collaboration



PV Manufacturing R&D



**Share knowledge and leverage capabilities and resources to advance science and technology**



# Technology Partnerships...



AVL CRADA and License



DuPont 'Biorefinery' CRADA & License

**Leverage intellectual property and know how  
to create new business opportunities**





# Deployment Partnerships ...



Reducing Barriers  
Created by  
Conflicting Codes  
and Standards



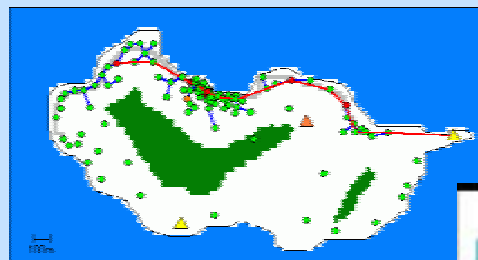
Reducing Barriers to Entrepreneurial  
Success



**Solar and Wind  
Energy Resource  
Assessment**



Reducing Barriers to Information



Technical Assistance



**Leverage knowledge and networks to remove market barriers**

# **U.S. Department of Energy's National Renewable Energy Laboratory**

## **Partner of Choice in Building a Clean Energy Future**



**Golden, Colorado**